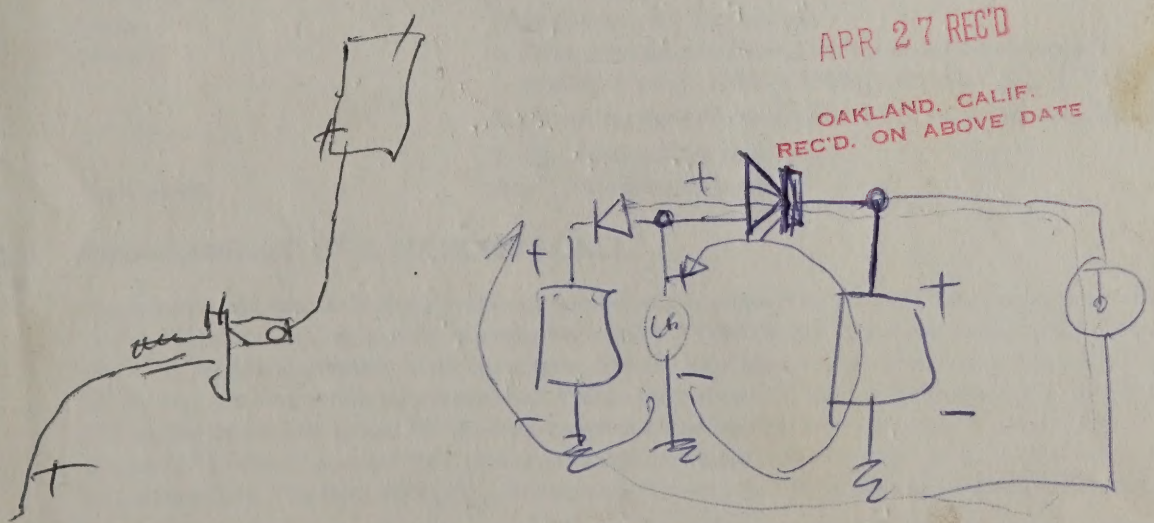
13/64" DRILL TO MOUNT LED

RO3/RO4

STEADY LED OUT.

Operating and Service Manual



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THE RO3A/RO4A SELECTIVE CALL DECODER

(WITH SOCKET BUILT INTO V119 CHASSIS)

1. GENERAL DESCRIPTION

The RO3A is a PC Board Assembly (9101 0776) together with the necessary hardware for an installation in a V107/108 or similar transceiver. The installation can be executed in the field or factory. The RO4A is the same PC Board Assembly together with the necessary hardware for a V119 Scan and Monitor receiver installation. The unit works off 12V DC and can be field programmed. Figure 1 shows the 9101 9776 PC Assembly.

The units can be programmed to accept a code length from 3 to 7 digits and works with the standard two tone 1500/600Hz Bell telephone selective call system. An example of such a signal is shown below.

TYPICAL SELECTIVE CALL SIGNAL

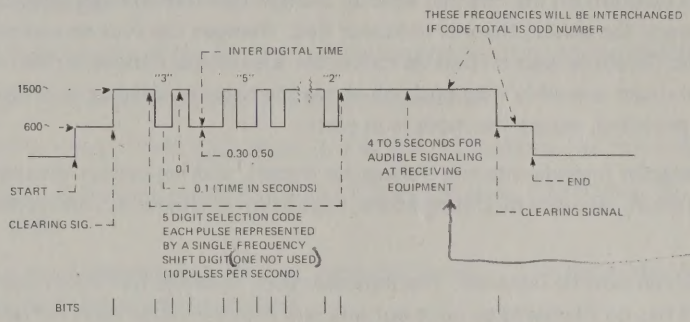


Figure 2

The selective call system is similar to the one used in MTS operations and for ground to air signaling. (FCC Rules and Regulation Volume VII Part 21 Subpart G).

The Base station in the VHF maritime service are normally set to the following tolerances:

	Freq. Tolerance	Carrier Deviation
600 Hz	±4Hz	±2.5KHz
1500 Hz	±10Hz	±4.5KHz

For applications with the 2805 Hz RCC system contact the factory.

2. SPECIFICATIONS

Power Supply	13.6V ±15% negative ground
Current Drain	20 mA standby
Input	1500/600 Hz ±1% 100 mV rms
Output	1. Tone continuous (option 1) or for about 4 to 5 seconds (option 2) pin 7. 1000 to 1500 Hz, 5V p-p Hi Z (>100K=R_L) 2. 20 mA for light emitting diode (LED) or similar indicator, pin 5. 3. Up to 200 mA for relay, pin 2.
Digit Length	3 to 7, field programmable

3. PROGRAMMING OF A SELECTIVE CALL

The selective call number is like a telephone number and is assigned by the telephone company or the shore station operator. Let's assume, for example the number XY65574. XY in this case designates channel 26 and is for telephone company internal use only. At first, let's tell the ringer board the expected code length (5). We connect the long yellow wire going from R39 to the output, "5" (pin 1) of the digit counter QA2. The resistor color code is used for the digit sequence encoding. The first wire (brown) connects point "A" to output "6" of the bit counter QA1. The second digit (red wire) then connects "B" to output "5" of the bit counter QA1. The third digit (also a 5) connects "C" through "B" to the output 5 of the bit counter.

An additional hole is provided at each letter input for such repetitious numbers. The fourth digit - a yellow wire – would connect from "D" to output of 7 of the bit counter, while the fifth digit – a green wire – connects from "E" to output "4" of the bit counter. Any remaining digit not used – in this case, digits 6 and 7 – need to be connected to ground. Four holes are provided for this at the right side of the PC Board.

This completes the programming, however one option remains to be determined. The audio alert tone available at pin 7 is selectable to be of a length of 4 to 5 seconds at the end of the proper code or continuous tone until the transmitter is keyed or the set turned off. This shorter yellow wire connects from R46 to R39 (intermittent, option 2), or from R46 to R41 (continuous, option 1).

4. INSTALLATION OF THE RINGER IN THE SET

4.1. The RO3A Kit for the V107, V108

Remove the channel selector module, A9, from the V107/V108 chassis. This will facilitate mounting of the ringer module assembly in its position on the channel selector switch. Remove channel selector knob from shaft, then loosen and slide back the plastic channel indicator disc. Remove the four screws securing channel selector assembly to the chassis. Carefully ease it from its connector socket and remove entire assembly from the transceiver. Mount the ringer assembly into position above the channel selector as shown in Figure 3. Using spacers and hardware provided, secure the module in place.

Replace the channel selector module into the transceiver chassis, making certain the unit is properly seated into its mating connector socket. Replace mounting screw, reposition channel disc, and replace knob on front panel.

The call indicator light can now be installed. The indicator used with the INTECH ringer option is a solid-state light emitting diode. It has no filaments to burn out and will provide many years of useful service. Locating a suitable area in the center of the V107/V108 front panel, very carefully drill a mounting hole using a 13/64" drill.

CAUTION: Avoid drilling too far causing serious damage to any internal components.

Solder a lead, approximately 12" long to each of the terminals of the light emitting diode. Prior to inserting the indicator, note which lead is connected to the cathode terminal as indicated by either a color dot or flat side of the indicator. Insert indicator from the inside of the transceiver into the hole just drilled. Route the two wires through the underside of the V107/V108 chassis to the socket on the ringer module. Cut to length and solder the lead from the cathode terminal to Pin 5 of the socket. Solder the remaining lead (anode) to Pin 3, being careful not to disturb the lead already attached to Pin 3. Next connect and solder leads of the ringer module socket as follows:

Pin 1 to a suitable ground buss on bottom of V107/V108 chassis
Pin 2 no connection (NO RELAY USED)
Pin 3 to Pin 3 of A1 module socket
Pin 4 no connection
Pin 6 no connection
Pin 7 to Pin 7 of A1 module socket
Pin 8 no connection
Pin 9 to Pin 9 of A3 module socket
PIN 10 GROUND

The RO3 ringer installation is now complete.

4.2. The R04A Kit for the V119

Insert the ringer board in the vacant slot on the right side of the V119. See Figure 4.

The call indicator light can now be installed. The indicator used with INTECH ringer option is a solid-state light emitting diode. It has no filaments to burn out and will provide many years of useful service. Locating a suitable area in the center of the V119 front panel, very carefully drill a mounting hole using a 13/64" drill.

CAUTION: Avoid drilling too far causing serious damage to any internal components.

Solder a lead, approximately 12" long to each of the terminals of the light emitting diode. Prior to inserting the indicator, note which lead is connected to the cathode terminal as indicated by either a color dot or flat side of the indicator. Insert the indicator from the inside of the V119 into the hole just drilled. Route the two wires through the underside of the V119 chassis to the socket into which the ringer module was inserted. Cut to length and solder wire from cathode terminal to Pin 5 of the socket. Solder remaining lead (anode) to Pin 3.

4.3. Installation in Other Radio Sets

The basic hookup is shown below. For special applications consult the factory.

SCHEMATIC HOOKUP IN OTHER RADIO SETS

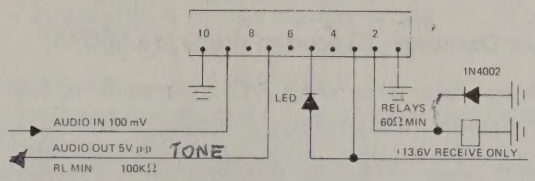


Figure 5

NOTE: The relay may be used to activate an external device like a horn or a siren.

5. Checkout of the Installation (V-108, etc.)

A few simple checks will assure you of the correct installation and function of the selective call unit.

5.1. Turn the channel selector to a weather channel (no transmit possible).

5.2. Measure supply voltage (nominal +13.6V DC) at pin 3. Key the microphone and the voltage should go to zero.

5.3. Ground pin 6 on the ringer socket and the front panel LED should light. CAUTION: Do not ground pin 5 as this will destroy the LED.

5.4. Apply a 1 KHz, 100 mV p-p signal through a 0.1 μF capacitor to pin 7. This signal should be audible through the loudspeaker independent of the volume setting.

5.5. Set the volume control to about one half and adjust the squelch control for a critical setting. Connect a code generator to pin 9. If no code generator is available, the local marine operator can sometimes provide the necessary check. Dial the number 1 plus the encoded number. This should light the LED and sound a tone in the loudspeaker.

5.6. Dial the number 1. The tone should stop if the ringer is connected for intermittent tone.

5.7. Key the microphone to reset the ringer and extinguish the LED.

6. CIRCUIT DESCRIPTION

6.1 Power Distribution

The incoming +13.6V is regulated for most on board user by CR4, CR5, and Q9 to about +9V. CR3 reduces this +9V to about +5V for the phase locked loop QA3 (PLL).

6.2. Frequency Discriminator

The incoming audio signal is capacitively coupled into the PLL QA3. The unit is fine tuned to 1500 Hz ±1% with R21. This frequency can be measured with a counter hooked up to pin 5 of QA3. The output of QA3 if low (close to ground potential) with 1500 Hz and high (about 4.5V) with 600 Hz applied.

6.3. Schmitt Trigger and Pulse Shaper

Q1 and Q2 form a Schmitt trigger to discriminate against Tonebursts of insufficient length (noise). The output is applied to a network formed by Q3, Q4, CR1 and CR2 for further shaping. A pulse is produced at the beginning and at the end of a 1500 Hz burst.

6.4. Bit Counter QA1

The pulses produced by the pulse shaping network are applied to the input of QA1, a CMOS Decade Counter. The output is high for a respective amount of bits transmitted, i.e., after six bits output six (pin 5). These outputs are applied through the colored encoding wires to the coincidence gates formed by the diodes CR11 through CR31.

6.5. 400 Millisecond Timer and Digit Counter

The pulses generated by the pulse shaping network are also applied to the base of Q10, an input to the set, reset flip flop. The collector of Q10 and the base of Q12 go low, the collector of Q12 high and a current flows through R27, R16 to charge up C4 and turn Q11 on, which provides a holding action to the flip flop. Any

new pulses received will discharge C4 by way of Q6. After 400 ms of uninterrupted charging, the voltage across C4 is sufficient to trigger Q7, a programmable uni-junction transistor. This action turns off Q8 for a time. Its collector goes high resetting the flip flop by way of QI3 and advancing the Digit Counter QA2 with CR6. The output of this CMOS Decade Counter is applied to the coincidence gates formed by the diodes CR11 through CR31.

6.6. Coincidence Gates and Error Detector (Encoded digits are 65574)

6.6.1. Digit received true (assume first digit received is "6"). CR12 is connected through "A" to QA1 output "6" which goes as high as the end of the sixth pulse.

CR13 is connected to QA2 output "0" which is high. This coincidence produces through CR11 a high at Q15 and a low at the collector of Q14. Now assume Q8 goes high (the 400 ms are up). This pulse is applied to the reset of the bit counter, and through CR6 to the input of the digit counter (pin 14) to advance it in preparation for the receipt of the next digit. Q14 is low which prevents, by way of CR9, the reset of the digit counter.

6.6.2. Digit received false (assume second digit received "4"). CR15 is connected through "B" (red wire) to QA1 output "5" low and output "4" is high.

CR17 is connected to QA2 output "1" which is high. Since only one of the inputs is high, Q15 is low, Q14 high. The 400 ms are up and Q8 goes high. This time this pulse is routed through CR8 to clear QA2 and QA1. The next digit transmitted will be received as digit "1."

6.6.3. Clearing the Counters

At the beginning and at the end of a selective call a "1" is transmitted for the purpose of clearing all counters. No codes contain a "1."

6.7. Output Circuitry

The right sequency of digits has been received when a high signal appears at the next higher digit line than the maximum encoded; e.g.—Code consists of 5 digits, a high signal on the sixth output of the digit counter means a true sequence. The digit counter starts at "0" therefore the sixth output is "5."

This pulse lasting 4 to 5 seconds (determined by the base station) is applied to the gate of SCR Q17 through R39. Q17 will stay on (after the 4-5 second pulse) since a holding path is provided through R44 and R43.

This current turns on Q18 a PNP power transistor, capable of providing up to 200 mA to operate a relay connected between pin 2 and ground. A 1N4002 diode should be connected in an anti-parallel mode with any inductive user.

An output, suitable to drive a light emitting diode (LED) is available at pin 5. R38 limits the current to about 20 mA.

R46 is the input to the audio oscillator Q19, a programmable unjunction transistor. If this input is high, an oscillation will appear at pin 7 with a frequency of 1000 to 1500 Hz and an amplitude of 5V p-p. The load should (normally pin 7 A1 board) not be any less than 100K ohms. This oscillator can be excited intermittened (option 2) or continuous (option 1) until the transmitter is keyed or the set turned off.

6.8. Reset After Receipt of True Code

The memory Q17 is normally reset by keying the transmitter, while answering the selective call.

The plus voltage applied at pin 3 and the LED has to be removed by the T-R switch for at least 10 seconds. This allows the capacitor C10 to discharge and the circuit is ready for the next selective call.

91010776 PC ASSEMBLY FRONT

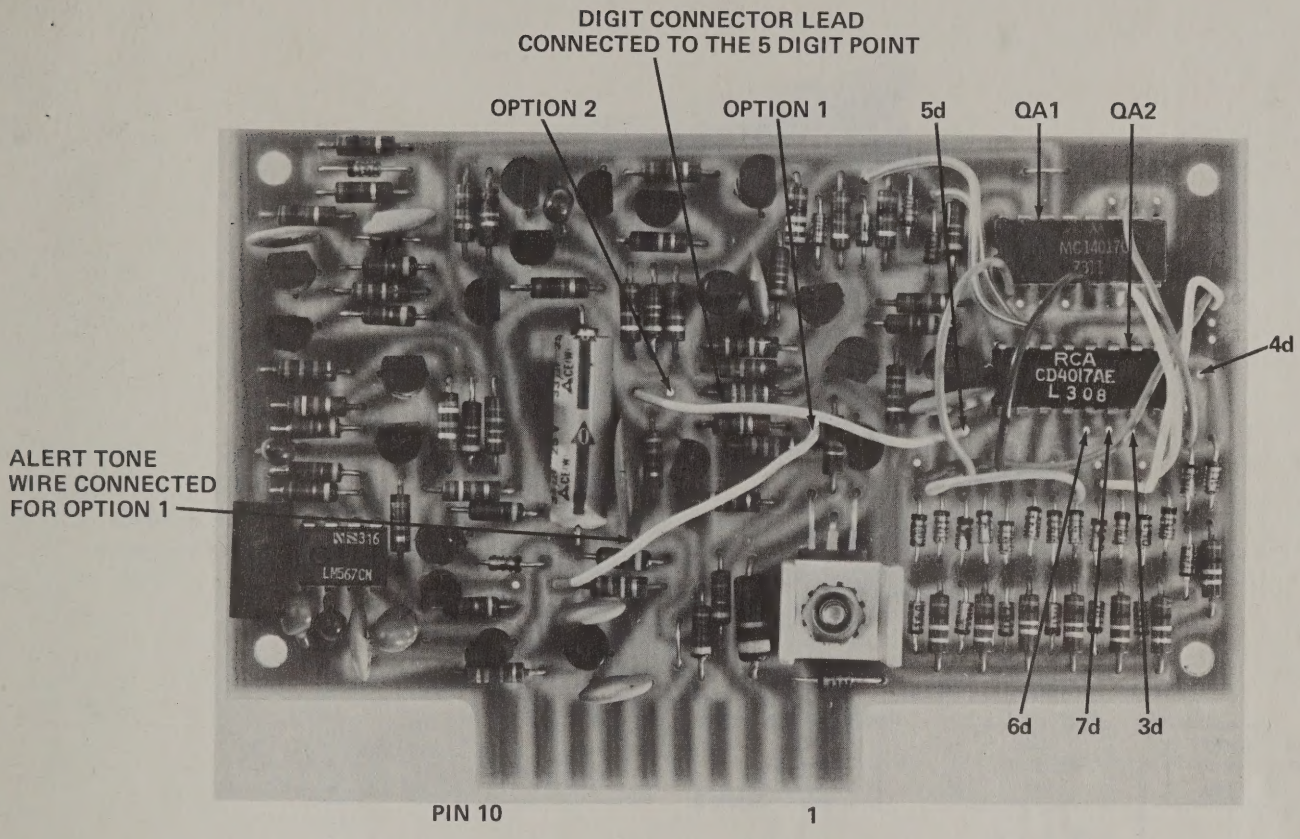


Figure 1

91010776 PC ASSEMBLY BACK

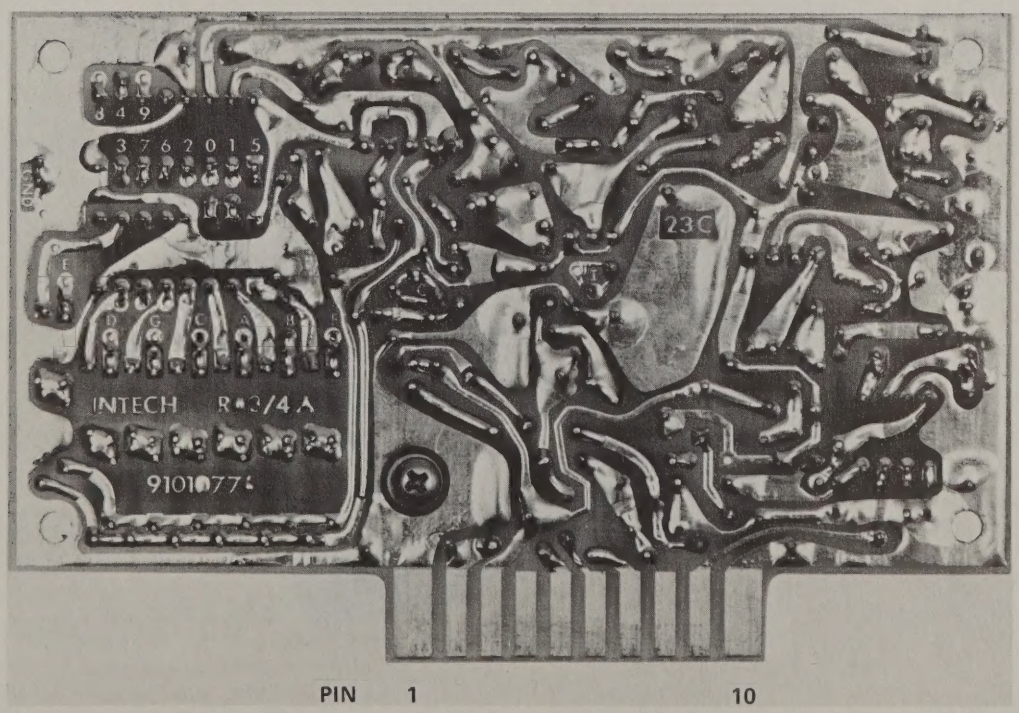


Figure 1a

V108 WITH R03 INSTALLED

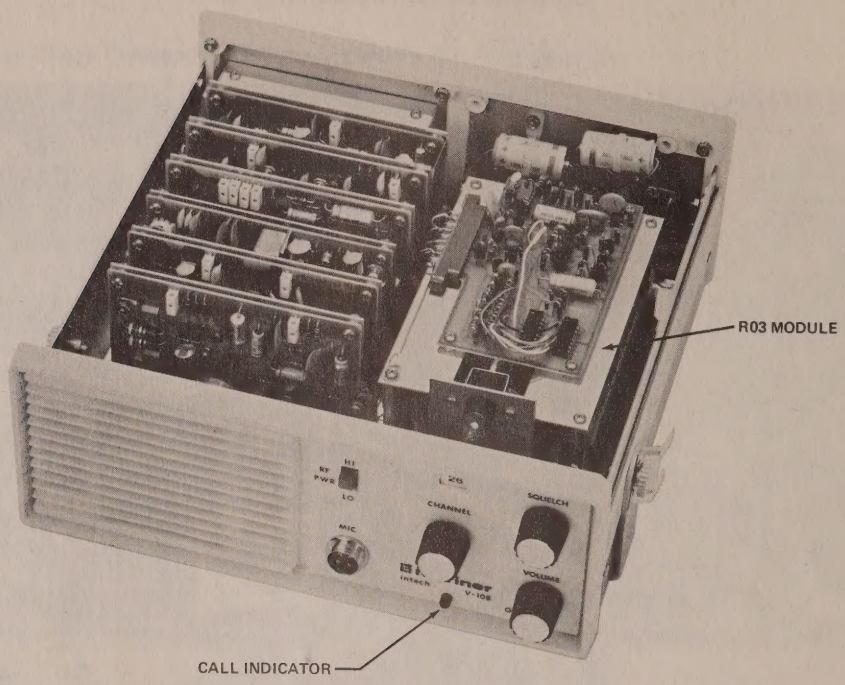


Figure 3

V119 WITH R04 INSTALLED

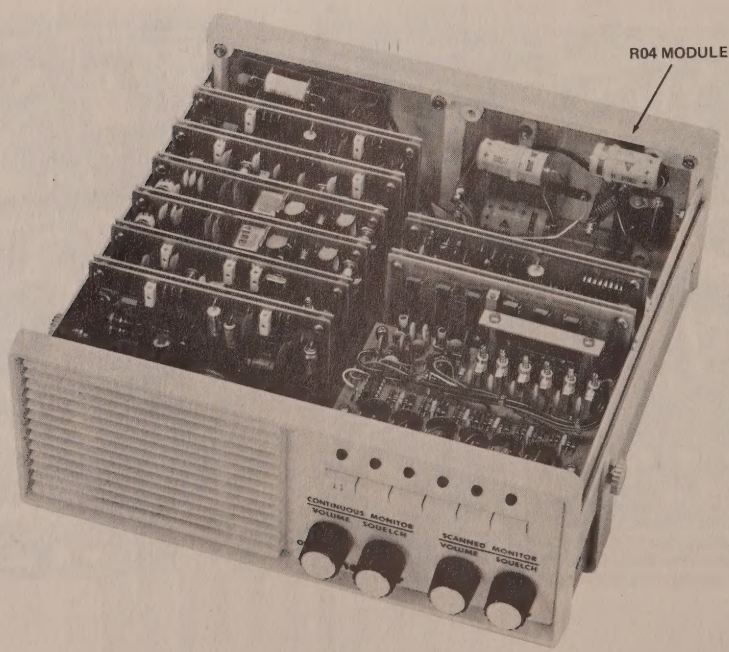


Figure 4

BLOCK DIAGRAM 91070776

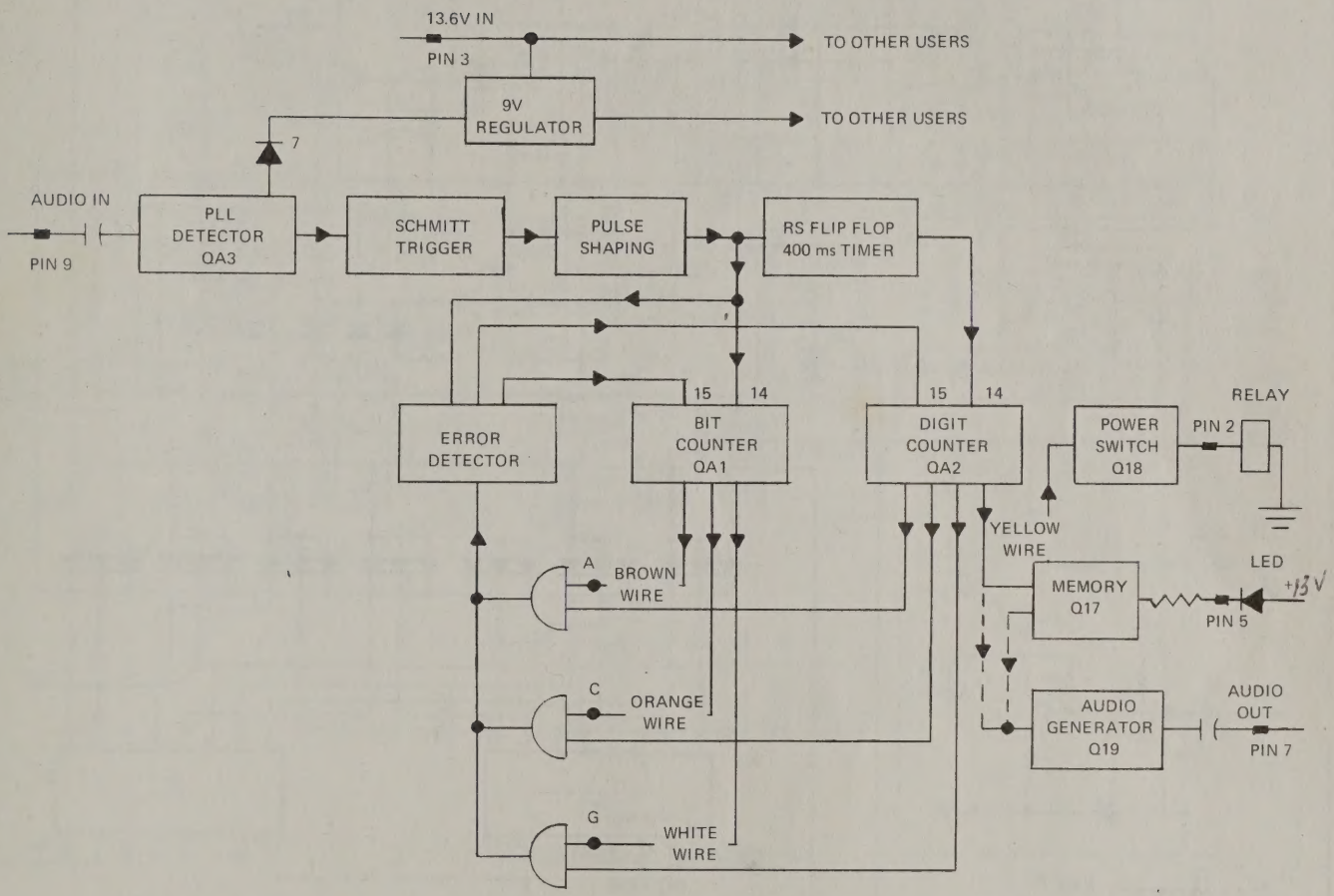
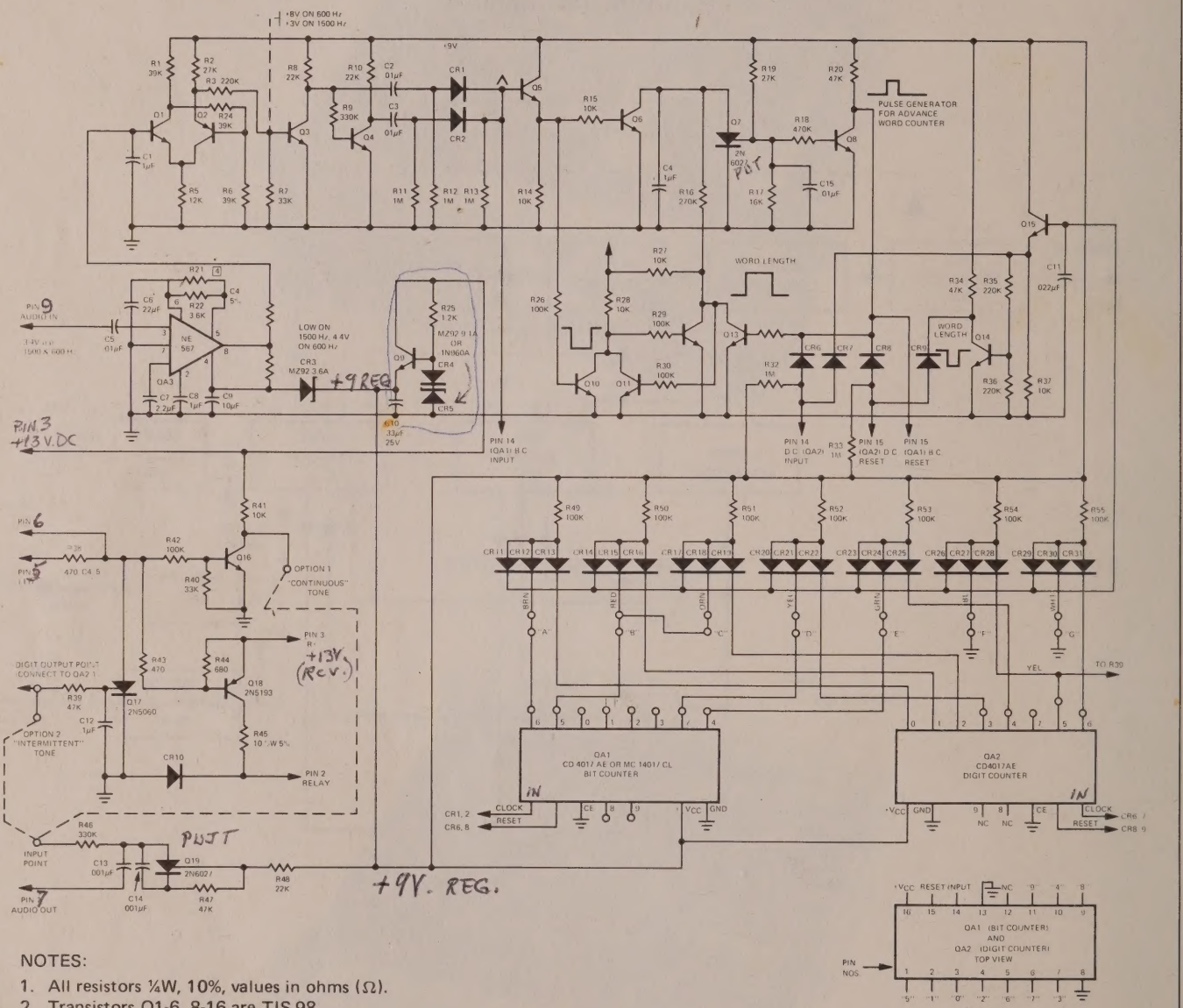


Figure 6

SCHEMATIC OF 91070776 RINGER ASSEMBLY



NOTES:

1. All resistors ¼W, 10%, values in ohms (Ω).
2. Transistors Q1-6, 8-16 are TIS 98.
3. Diodes CR1, 2, 4, 6-31 are 1N4148.
4. R21 is selected in test for FO= 1500 Hz ±1%.
5. See general note list 91010776-02.

Figure 8

R03/04 ASSEMBLY

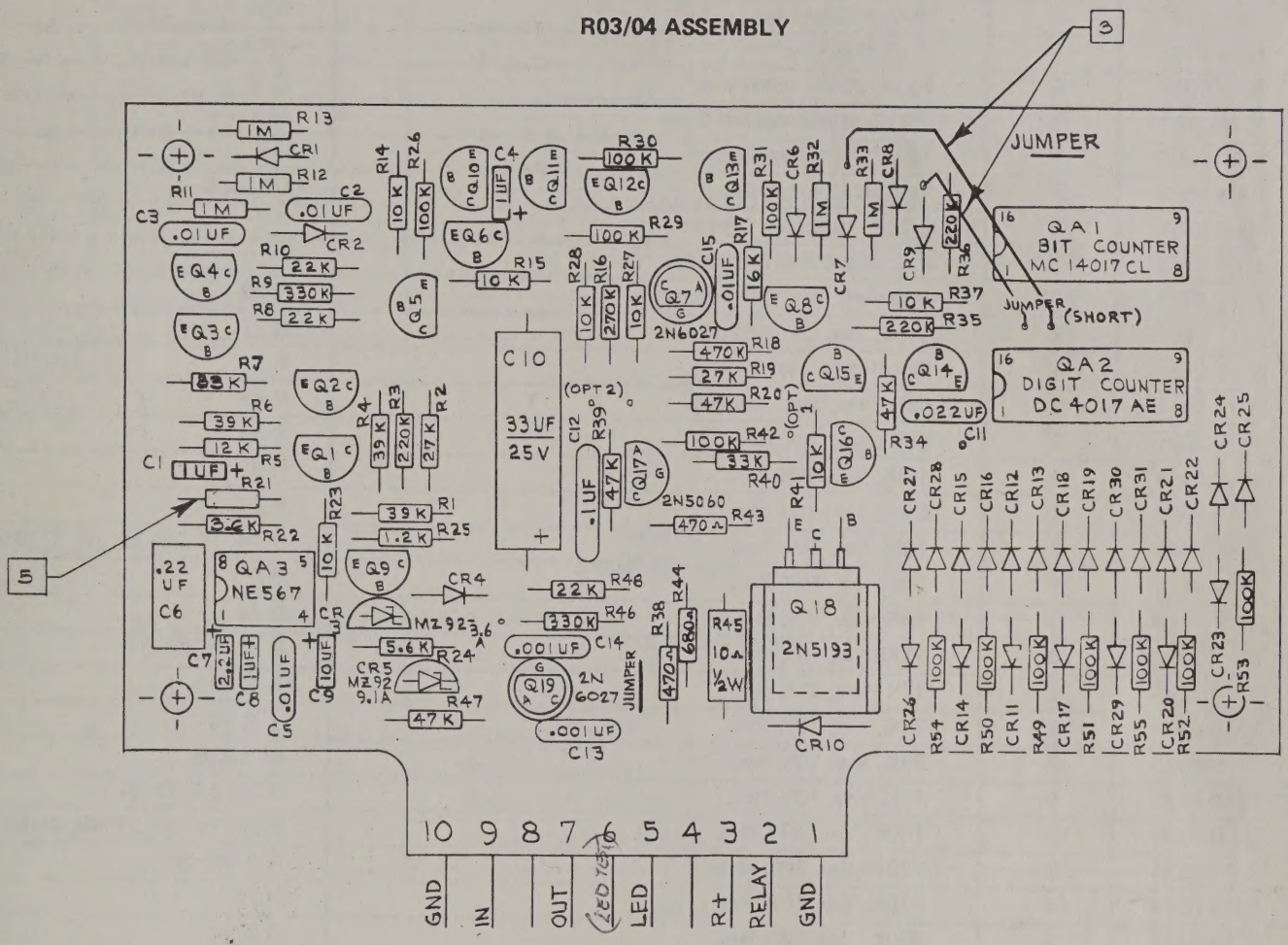


Figure 9

ASSEMBLY, RINGER
R03/04

NOTE: U.O.S.

1. Transistors Q1-6, 8-16 are TIS 98.
2. Diodes CR1, 2, 4, 6-31 are 1N4148.
3. #26 GA wire and teflon sleeving A/R.
4. Encode board in assembly as shown in general note list, P/N 91010776-02.
5. R21 is selected in test for FO = 1500 Hz ± 1%.

R03/04
RINGER BOARD

PART NO.	QTY.	DESCRIPTION	REF. DES.
1008 1147	2	.001 μf, Disc Cap	C 13, 14
1008 1155	3	.01 μf, Disc Cap	C 2, 3, 5, 15
1008 1157	1	.022 μf, Disc Cap	C 11
1008 1161	1	.1 μf, Disc Cap	C 12
1012 0006	1	33 μf, 25V Electrolytic	C 10
1028 0251	1	.22 μf, Mylar Molded Case	C 6
1044 0300	1	10 μf, Tantalum Dipped	C 9
1044 0303	3	1 μf, Tantalum Dipped	C 1, 4, 8
1044 0304	1	2.2 μf, Tantalum Dipped	C 7
2301 0776	1	P.C. Board Rev C R03/4A	
2511 3471	1	470 ohm, ¼w, C4 Corning	R 38
2511 4362	1	3.6K, ¼w, C4 Corning, 5%	R 22
2511 xxxx	1	Selected in Test	R 21
2519 3471	1	470 ohm, ¼w, 10% Res.	R 43
2519 3681	1	680 ohm, ¼w, 10% Res.	R 44
2519 4122	1	1.2K, ¼w, 10% Res.	R 25
2519 4562	1	5.6K, ¼w, 10% Res.	R 24
2519 5103	7	10K, ¼w, 10% Res.	R 14, 15, 23, 27, 28, 37, 41
2519 5123	1	12K, ¼w, 10% Res.	R 5
2519 5163	1	16K, ¼w, 10% Res.	R 17
2519 5223	3	22K, ¼w, 10% Res.	R 8, 10, 48
2519 5273	2	27K, ¼w, 10% Res.	R 2, 19
2519 5333	2	33K, ¼w, 10% Res.	R 7, 40
2519 5393	3	39K, ¼w, 10% Res.	R 1, 4, 6
2519 5473	4	47K, ¼w, 10% Res.	R 20, 34, 39, 47
2519 6104	12	100K, ¼w, 10% Res.	R 26, 29, 30, 31, 42, 49-55
2519 6224	3	220K, ¼w, 10% Res.	R 3, 35, 36
2519 6274	1	270K, ¼w, 10% Res.	R 16
2519 6334	2	330K, ¼w, 10% Res.	R 9, 46
2519 6474	1	470K, ¼w, 10% Res.	R 18
2519 7105	5	1M, ¼w, 10% Res.	R 11, 12, 13, 32, 33
2520 2100	1	10 ohm, ½w, C5 Corning, 5%	R 45
2810 0102	29	1N4148, Diode	CR 1, 2, 4, 6-31
2810 0131	1	MZ92-3.6 A, Diode	CR 3
2810 0143	1	MZ91-9.1 A, Diode	CR 5
2810 0129	1	NE 567, P.L.L.	QA 3
2860 0302	1	Digit counter, CD4017AE (only)	QA 2
2860 0302	1	Bit counter, MC14017CL, CD4017AE	QA 1
2870 0105	15	TIS 98, Transistor	Q 1-6, 8-16
2870 0128	1	2N5193, Transistor	Q 18
2870 0192	1	2N5060, Transistor	Q 17
2870 0193	2	2N6027, Transistor	Q 7, 19
3630 0003	2.7"	Wire, Solid 26 ga.	
3600 0525	4.5"	Brown, Stranded 26 ga.	
3600 0526	2.2"	Red, Stranded 26 ga.	
3600 0527	2.2"	Orange, Stranded 26 ga.	

R03/04
RINGER BOARD (Continued)

PART NO.	QTY.	DESCRIPTION	REF. DES.
3600 0528	7.5"	Yellow, Stranded 26 ga.	
3600 0529	2.2"	Green, Stranded 26 ga.	
3600 0530	2.2"	Blue, Stranded 26 ga.	
3600 0533	2.2"	White, Stranded 26 ga.	
3600 0534	2.2"	Black, Stranded 26 ga.	
5065 0001	1	Pop Rivet, 1/8 dia .3 lg.	
5101 0118	1	Heatsink (for power tran.)	
		ALTERNATE HEATSINK METHOD	
5010 0054	1	Screw, 4-40 x 3/8"	
5030 0127	1	Nut, 4-40 KEP	
5101 0060	1	Heatsink	

Figure 10 (Continued)

R04/A
RINGER KIT

PART NO.	QTY.	DESCRIPTION	REF. DES.
1900 0002	1	L.E.D.	
5010 0052	6	Screw, 4-40 x ¼"	
5101 0002	1	Shield, P.C. Board	
9101 0776	1	Ringer Card, R03/4A	
9101 0785	1	Installation Instructions	

Figure 11

R03/A
RINGER KIT

PART NO.	QTY.	DESCRIPTION	REF. DES.
1431 0001	1	Connector, 10 PIN	
1450 0001	1	LUG #4, Solder	
1900 0002	1	L.E.D.	
5010 0052	4	Screw, 4-40 x ¼	
5010 0065	4	Screw, 4-40 x 1¾	
5040 0021	4	Spacer, 1½" Long ¼" O.D.	
5101 0040	1	Bracket, Mounting	
9101 0776	1	Ringer Card, R03/4A	
9101 0784	1	Installation Instructions	

Figure 12